

Effect of Preexisting Organic Aerosols on Secondary Organic Aerosol Formation from Ozonolysis of α -Pinene

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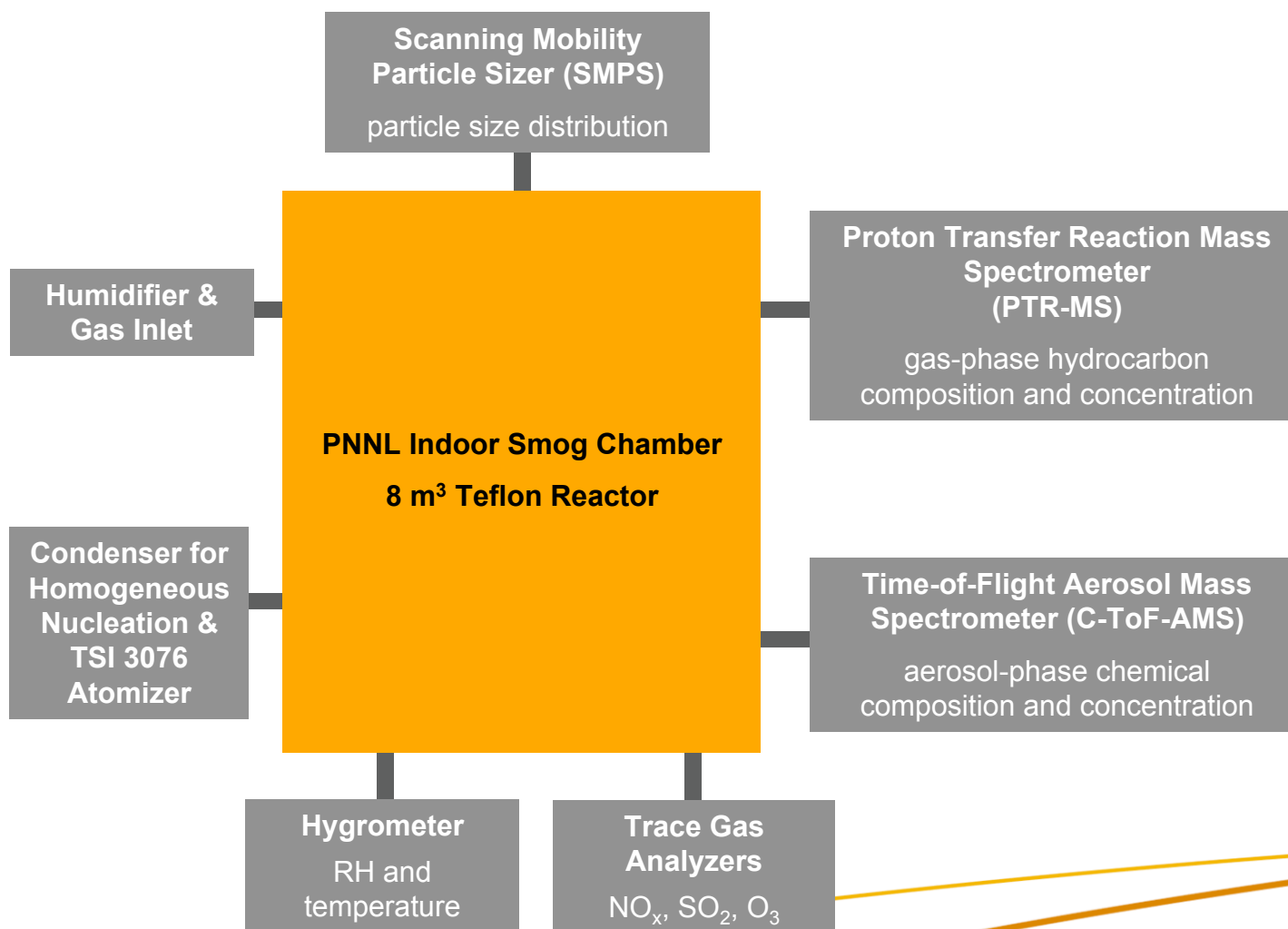
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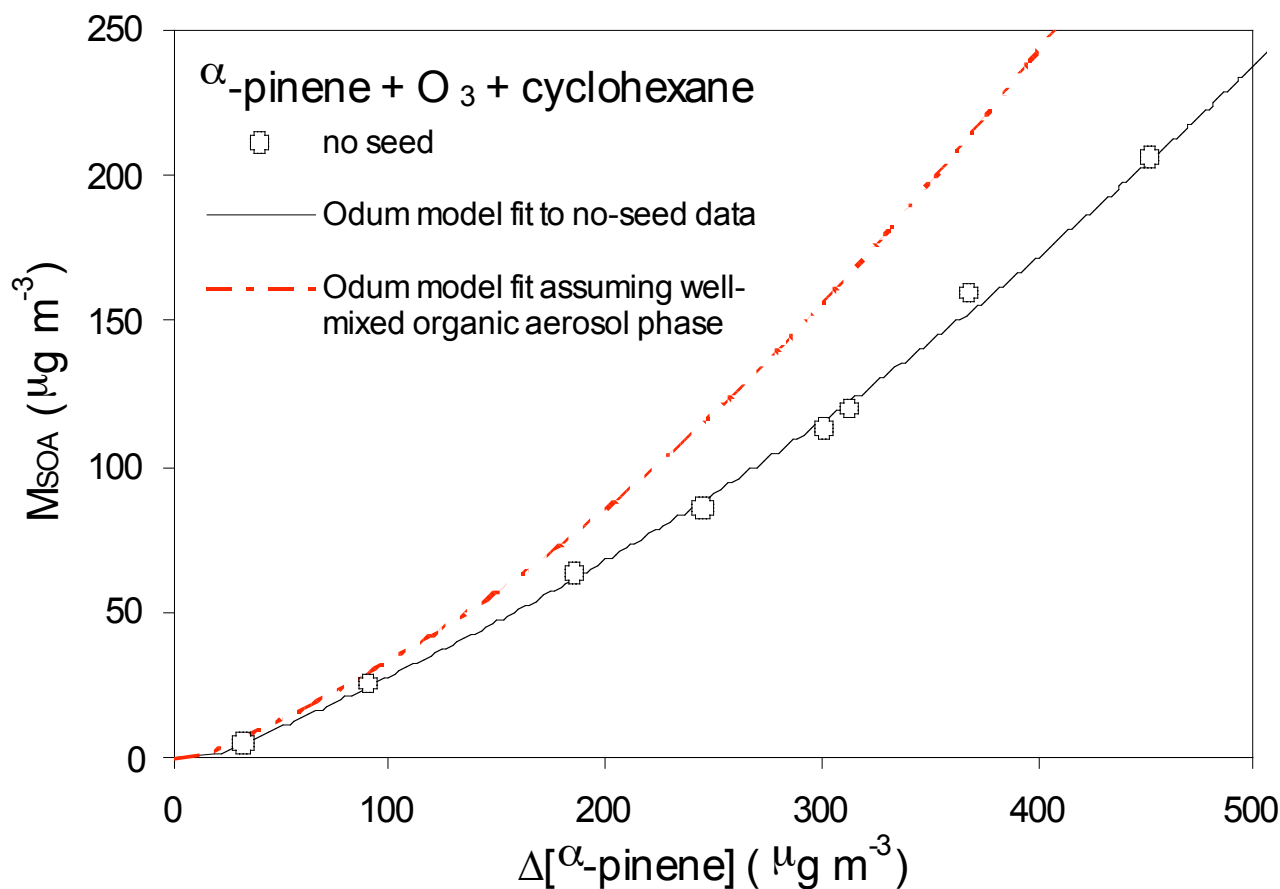
Motivation

- Smog chamber experiments → SOA Yield vs. SOA Mass (Raoult's Law) → Parameterized SOA model → 3-D aerosol and air quality models
- Semi-empirical SOA models typically assume a well-mixed organic aerosol phase even in the presence of hydrophobic primary organic aerosols (POA).
- This assumption significantly enhances the modeled SOA formation levels (*Kanakidou et al.*, 2000; *Chung and Seinfeld*, 2002; *Tsigaridis et al.*, 2006; *Liao et al.*, 2007).
- We investigate the applicability of this assumption by measuring SOA formation from ozonolysis of α -pinene in the absence and in the presence of hydrophobic and hydrophilic organic seed aerosols.

Experimental Facility and Instrumentation

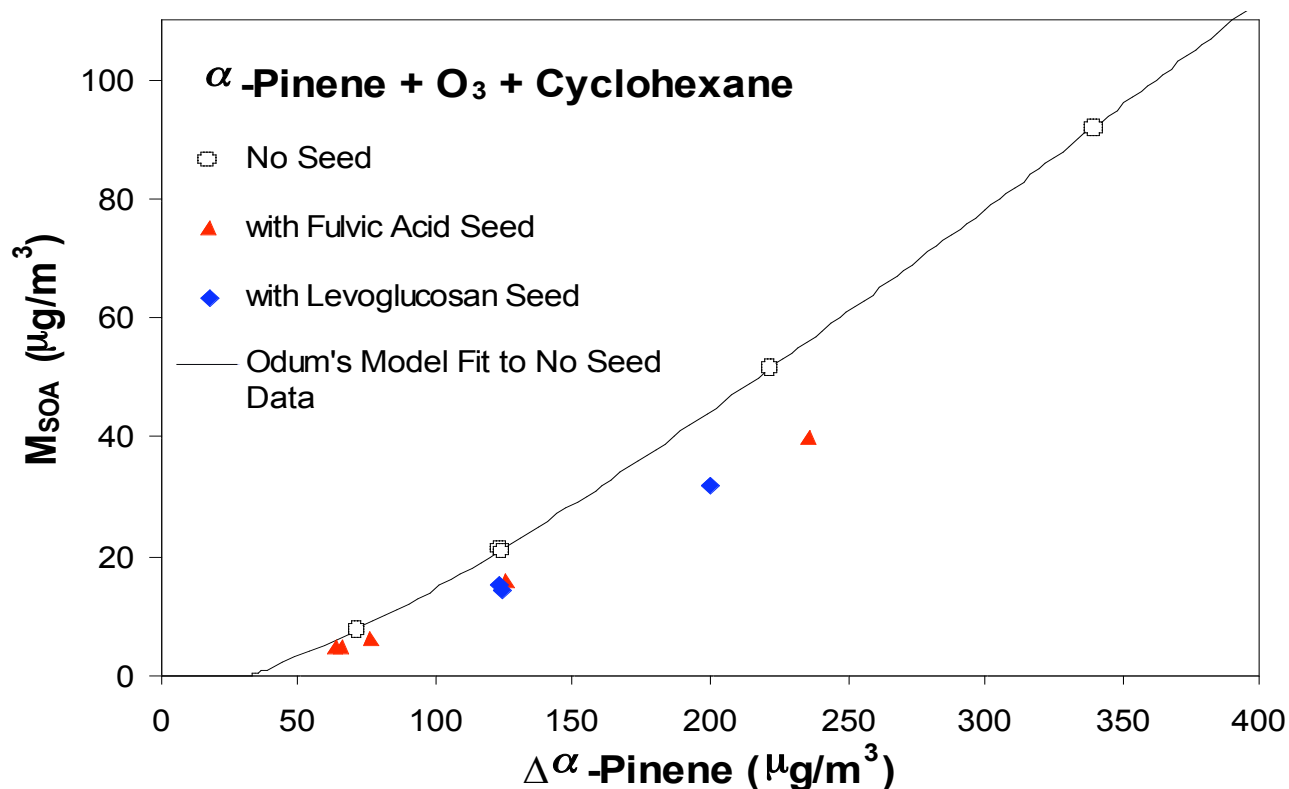


Effect of Hydrophobic Organic Seed Aerosols (DOP & Lubricating Oil) in Dry Condition (RH < 2%)



Song et al., Geophys. Res. Lett., 34, L20803, 2007.

Effect of Hydrophilic Organic Seed Aerosol (Fulvic Acid and Levoglucosan) RH ~ 50%



The SOA yields in the absence of any seed aerosols are about 30 ~ 40% higher than those obtained in the presence of fulvic acid and levoglucosan seed aerosols.

Conclusions and Next Steps

- α -Pinene SOA yield is not sensitive to the preexisting hydrophobic POA mass, it is likely that α -pinene SOA and hydrophobic POA form two separate phases.
- Why α -pinene SOA yield decreases in the presence of aqueous hydrophilic organic seed is not clear.....(similar results from *Cocker et al., 2001a*.)
- A more detailed chemical speciation of the aerosol-phase organic species with a high-resolution mass spectrometer (LTQ Orbitrap Hybrid Mass Spectrometer) is needed.
- Rerun hydrophilic organic seed experiments under dry conditions.

